The natural history and conservation of *Acrocephalus rimitarae*, the endemic reed-warbler of Rimatara Island, Oceania

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With a small population on a single small island, Rimatara Reed-warbler *Acrocephalus rimitarae* is considered Vulnerable (BirdLife International 2004). Because of its morphological resemblance to two other taxa from the Pitcairn group (*A. taiti* on Henderson and *A. vaughani* on Pitcairn), it was described by Murphy & Mathews (1929) as a subspecies of *A. vaughani*. Subsequently, it was elevated to specific status on the basis of differences in coloration, which suggest substantial genetic differentiation as a result of the geographical isolation of Rimatara, *c.*2,500 km from the Pitcairn group (Graves 1992). Little is known of the life history of this insular endemic, and other data are very scattered (Holyoak & Thibault 1984, BirdLife International 2004). Here, we present new data on the Rimatara Reed-warbler collected during a visit to the island in 2004, which was conducted as part of a research programme on the systematics and evolution of *Acrocephalus* taxa endemic to eastern Polynesia.

Study site and methods

Situated in the Austral Islands (French Polynesia), Rimatara (22°40'S, 152°45'W) is a small (*c.*8.6 km^2) and low (max. elevation 84 m) island, *c.*160 km from its nearest neighbour, Rurutu. J-CT visited the island on 25 October–6 November 2004. Birds were caught with mist-nets, using pre-recorded songs. Because Rimatara Reed-warbler sings rarely, we used vocalisations from *Acrocephalus* populations on Tahiti and the Marquesas (McPherson 1995, pers. recordings) to attract individuals (mostly males, sexed by coloration and measurements). Each bird caught was measured and photographed in order to describe plumage patterns; this work was complemented by examination of specimens at the American Museum of Natural History (New York). The precise locations of occupied nests, families with fledglings and birds mist-netted were mapped using a Garmin e-trex Global Positioning System (GPS). Using MapInfo 5.0 software, a numeric topographic map and GPS coordinates, territories were mapped and distances between them calculated. We pooled breeding data for Palearctic reed-warblers *Acrocephalus* spp. (Cramp 1992) to approximate the mean length for incubation (14 days) and fledging (14 days), which figures were used to guess the laying date for the observed occupied nests and fledglings (young birds with short tails).

Results and discussion

Plumage

The three taxa of the *vaughani* group are characterised by their coloration, brownish grey to dark olive above and white to yellowish below, with partial albinism of wing- and tail-feathers, as well as body plumage (Murphy & Mathews 1929, Pratt *et al.* 1987). In *rimitarae*, we observed the following plumages which may be age-related: (i) uniformly brown above, whiter with cinnamon to variable extent on flanks and breast (<1 year), (ii) brownish grey to dark olive above, white to yellowish below, showing a variable but small number of white feathers (>1 year and breeding adults), (iii) mantle, scapulars, tail-feathers and underparts white (breeders), males exhibiting more white than females (Fig. 1). Age inferences are based on direct observations during field work for immatures and breeding adults, and gonad size and label information for specimens. The extent of albinism in Henderson Reed-warbler *A. taiti* is reportedly related to age and sex (Holyoak 1978, Graves 1992, Brooke & Hartley 1995).

Range and population

Rimatara Reed-warblers are found throughout the island, even in swamps (80 ha) and the central fern-covered hills (240 ha), but breeding occurs mainly in wooded

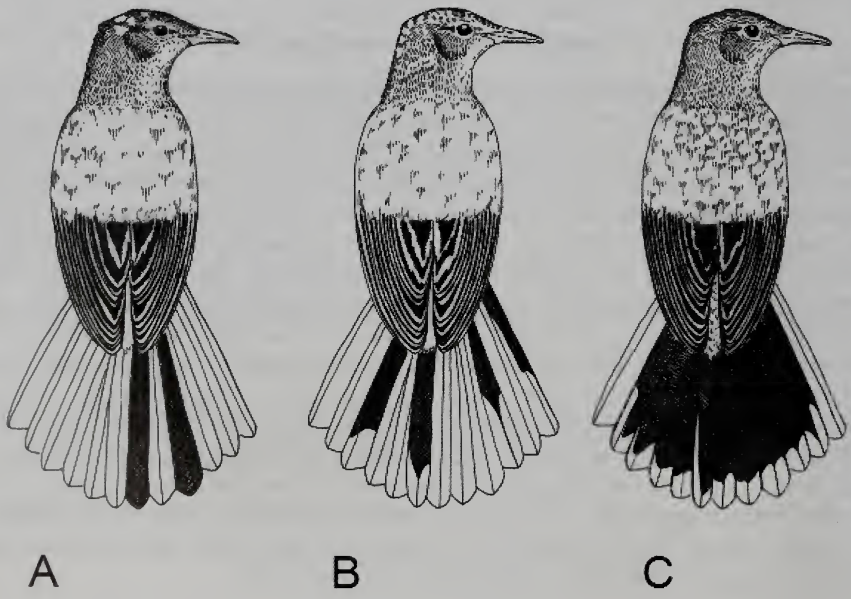

Figure 1. Plumage variation of Rimatara Reed-warbler *Acrocephalus rimitarae*, from mist-netted individuals. A, breeding male; B, breeding female; C, adult from a trio (A. Cibois).

areas such as the undergrowth of coconut groves, mixed horticulture (340 ha), coastal forest (30 ha) and natural forest on limestone substrates (170 ha) (Meyer *et al*. 2005). Nests, territorial birds captured or families observed were separated by a mean 96 m (± 26.9, *n*=17). Circular territories of radius 48 m have a mean size of *c*.0.72 ha. With a mean 2.37 birds per breeding group (see below), the breeding population in the 540 ha of suitable habitat would be 1,777 birds, or 2,567 if extrapolated to the 240 ha of less suitable habitat where fewer birds probably breed. However, based on transects, other authors give a notably lower estimate of the population: 2002, 740 birds (Sandford & Raust 2002) and 2004, 675 birds (Anon. 2005).

Song activity

Even in the breeding season, males sing regularly in early morning, in the evening, or during bright moonlit nights (pers. obs.) but rarely during midday. The 1920–23 Whitney South Sea Expedition (WSSE), conducted by the American Museum of Natural History, visited the island of Rimatara for eight days in March–April 1921. At that time, Quayle (ms) noticed that 'at daylight the warblers were chirping about'. Later he wrote: 'Here is a warbler singing with all the variation and harmony of Marquesan or Tahitian varieties'. The song can be described as a succession of low and short whistling notes (pers. obs.; it was unfortunately not possible to record songs during our field work). In comparison, reed-warblers from Tahiti (*A. caffer*), the Tuamotus (*A. atyphus*) or Marquesas (*A. mendanae*) produce a more powerful, longer and more elaborate song, at any time of day, less frequently at night (Holyoak & Thibault 1984), and at all seasons. Males from Pitcairn and Henderson have been reported not to sing (Nicoll 1904, Quayle ms, Mayr 1942, Williams 1960), but Graves (1992) considerered the series of thin and longer notes produce by males a song. Birds from Rimatara produce a variety of additional vocalisations similar to those of other Polynesian reed-warblers: alarm calls and contact calls by both sexes, and solicitation calls by both females and young (AC & J-CT unpubl.). It seems unlikely that the lack of strong and elaborate song in the *vaughani* group is related to their high density, as suggested by Graves (1992), because densities in Rimatara are similar to those in the Marquesas, where reed-warblers possess a long and elaborate song. The mean distance between singing birds on Nuku Hiva is 102 m (± 38.6, *n*=8) (pers. obs.), comparable to the value of 96 m (± 26.9) on Rimatara (see above).

Breeding

Nests were found in seven species of trees: *Hibiscus tiliaceus* (2), *Coffea arabica* (2), *Polyscias guilfoylei* (1), *Thespesia populnea* (1), *Syzygium jambos* (1), *Falcataria moluccana* (1) and *Citrus aurantifolia* (1). Most of these are introduced species. The nests were located at variable heights, with a mean of 5.2 m (± 3.7, *n*=9). They were on vertical branches, near the top of the vegetation and generally concealed by leaves. Nests were constructed of fibres of *Cocos nucifera*, *Pandanus* *tectorius* and *Ceiba pentandra*, leaves of *Passiflora maliformis*, and were lined with finer material of the same plants. The mean dimensions of three nests were: height 12.5 cm, depth 5 cm, external diameter 10 cm. Position in the trees, shape and size did not differ from those of other Polynesian reed-warblers (Schreiber 1979, Holyoak & Thibault 1984, Graves 1992, Brooke & Hartley 1995).

We found two occupied nests and six broods of fledglings. According to the estimated mean lengths for incubation and for rearing, laying dates were calculated as being between 17 September and 19 October. In addition, we observed a recently completed nest, ready for eggs, on 3 November, and adults constructing a new nest on 2 November in another location. The only previous data concerned a complete clutch (of two eggs) on 10–11 December 1989 (Seitre & Seitre undated). No occupied nests were found in March–April (Quayle ms, Sandford & Raust 2002), or in August (Blanvillain 2002). Labels of most skins (21/25) in adult plumage, collected in March during the WSSE, indicate small gonads, only one being labelled 'large'. These observations suggest that the breeding period is well defined, and lasts from at least mid September until late December, which corresponds to the breeding period of Henderson Reed-warbler (Brooke & Hartley 1995) in the Pitcairn group and at a similar latitude. The number of chicks in occupied nests varied from one (*n*=1) to two (*n*=1), as did numbers of young in fledged broods (one fledgling *n*=5; two fledglings *n*=1). The deduced mean brood (1.25 ± 0.46 young, *n*=8) is lower than that of Henderson Reed-warbler (2.41 ± 0.62 young, *n*=17) (Brooke & Hartley 1995).

In two nests, we identified three different adults feeding the young, due to individual variation in partial albinism and a small mark we painted on the forehead of captured birds. Moreover, in response to playback within their territories, we noted 2–3 birds reacting simultaneously in 20 and 17 cases, respectively, suggesting a mean 2.37 birds per breeding group. Breeding in trios is known in several insular reed-warbler populations (Komdeur 1991), and has been observed in Henderson Reed-warbler (Brooke & Hartley 1995), whilst our data suggest such behaviour is common also for Rimatara Reed-warbler. Nevertheless, Pitcairn Reed-warbler seems to breed only in pairs possibly because of greater disturbance and inter-annual habitat changes on that island (Brooke & Hartley 1995).

TABLE 1

Data on the moult period of Rimatara Reed-warbler *Acrocephalus rimitarae* (see Moult section for classification).

Date	Age	No moult, fresh plumage	No moult, worn plumage	Remiges moulting
March 1921 (41 skins examined at AMNH)	> 1 year	5	0	20
	< 1 year	13	2	1
Oct.–Nov. 2004 (17 individuals trapped in the field)	> 1 year	0	9	0
	< 1 year	7	0	1

Moult

For the moult analysis, we distinguished two age categories: >1 year (= adult) and <1 year (immature). Adults correspond to sexually mature individuals identified by their exhibiting breeding behaviour, large gonad size or, outside the breeding season, by their plumage characteristics (large number of albinistic feathers). Immatures were identified by their plumage characteristics (absence of albinistic feathers) and small gonads. All adults caught during the breeding season, in October–November, had completely worn plumage, whereas 80% of adults collected in March (i.e. post-breeding) had flight-feathers in moult (Table 1). From these observations we deduce that the moult of Rimatara Reed-warblers is post-nuptial and seasonal for adults. Immatures had mostly fresh, non-moulting plumage both in March (81%) and October–November (87.5%).

Threats

Currently, Black Rat *Rattus rattus* is absent from Rimatara, but Polynesian Rat *R. exulans* and Norway Rat *R. norvegicus* have been introduced. Polynesian Rat was intentionally introduced by Polynesians hundreds of years ago and is not known to predate Polynesian reed-warblers (Thibault *et al.* 2002). Norway Rat was introduced much more recently, in the late 20th century (McCormack & Künzlé 1996), but we suspect it is not a threat to endemic landbirds as it does not climb trees. Domestic and feral cats are numerous throughout Rimatara, and possibly constitute a threat because reed-warblers often forage on the ground (pers. obs.). Cat eradication on Pitcairn, though ultimately unsuccessful, led to a temporary increase in reed-warbler populations (B. & D. Bell *in* BirdLife International 2000). Another important concern is the possibility of the arrival of the exotic Common Myna *Acridotheres tristis*, which is already present on the nearest islands of Rurutu and Tubuai. Indeed, all populations of Polynesian reed-warblers have decreased or vanished following its arrival (Cibois & Thibault in prep.). Should the species reach Rimatara, it would certainly place the reed-warbler population at risk, especially in open wooded areas, such as plantations or gardens, which have been colonised rapidly by mynas on other islands.

Beside the introduction of alien species, the major threat to Rimatara Reed-warbler is habitat destruction. Our observations suggest that reed-warblers require wooded areas for foraging and breeding, although they forage regularly in marshy areas. Most of the island consists of plantations and coconut groves with undergrowth, i.e. habitats relatively stable in distribution and suitable for reed-warblers, though people often use uncontrolled fires for clearing. Natural forest was restricted to a limestone area that constituted, until recently, *c.*21% of the total surface of the island (=170 ha). But the construction of an airport in 2002 resulted in the clearance of *c.*65 ha of the most representative part of this natural forest (i.e. 40% according to Meyer *et al.* 2005). Thus, we estimate that this area supported several dozen reed-warblers. Preservation of the island's remaining natural forest should be a priority in order to secure the future of Rimatara's endemic birds.

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First description of male Hoogerwerf's Pheasant *Lophura* (*inornata*) *hoogerwerfi* (Chasen, 1939), with notes on distribution

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Hoogerwerf's Pheasant *Lophura hoogerwerfi* is an enigmatic taxon, probably endemic to montane Aceh, northern Sumatra, Indonesia. More than 60 years since the first female was collected, we found several of these birds at a bird market in Medan, north Sumatra. Here, we present a brief overview of knowledge of this pheasant, provide a description of the adults (including the first complete description of the male) and review the species' distribution.

The taxon is known from only two female specimens; the holotype, collected by A. Hoogerwerf, on 24 April 1937, at 1,400 m, near Lake Meluwak in the Gayo Highlands, Aceh (Chasen 1939, Chasen & Hoogerwerf 1941), and one taken in March 1939 by Dillon Ripley (Meyer de Schauensee & Ripley 1940), also in the vicinity of Lake Meluwak, at 650 m. Male *L. hoogerwerfi* has hitherto not been collected. In the 1970s regular sightings were made by N. van Strien (pers. comm. 1998), including that of a nest with two eggs in the Mamas Valley, Gunung Leuser National Park, Aceh (van Marle & Voous 1988). He obtained photographs of the pheasants, revealing them to be uniformly brown in females and bluish black in males, like those of Salvadori's Pheasant *L. inornata,* which occurs further south in Sumatra. The appropriate taxonomy of the two forms is therefore unresolved (Delacour 1977, Holmes 1989, van Balen & Holmes 1993, McGowan & Garson 1995, MacKinnon *et al.* 1998).

On 14 September 1998, during a routine check of Medan bird markets to monitor wildlife trade, RS & CRS found two female pheasants that were initially thought to be *L. inornata.* They had arrived with a consignment from Aceh, and after checking MacKinnon & Phillipps (1993) and MacKinnon *et al.* (1998) we suspected that we were dealing with *hoogerwerfi* rather than *inornata.* Both were obtained and temporarily housed in Medan Zoo. On 25 September 1998, during another visit to these markets, we found a further female and three males. These four were also obtained for the zoo but, due to the poor health and inadequate care of all six birds whilst in the market, only one female and one male survived.